

Ecological site R026XY078NV CLAYPAN 12-14 P.Z.

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 026X–Carson Basin and Mountains

The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark the western boundary of this area. Elevations range from about 3,806 feet (1,160 meters) on the west shore of Pyramid Lake to 11,653 feet (3,552 meters) on the summit of Mount Patterson in the Sweetwater Mountains.

Valley areas are dominantly composed of Quaternary alluvial deposits with Quaternary playa or alluvial flat deposits often occupying the lowest valley bottoms in the internally drained valleys, and river deposited alluvium being dominant in externally drained valleys. Hills and mountains are dominantly Tertiary andesitic flows, breccias, ash flow tuffs, rhyolite tuffs or granodioritic rocks. Quaternary basalt flows are present in lesser amounts, and Jurassic and Triassic limestone and shale, and Precambrian limestone and dolomite are also present in very limited amounts. Also of limited extent are glacial till deposits along the east flank of the Sierra Nevada Mountains, the result of alpine glaciation.

The average annual precipitation in this area is 5 to 36 inches (125 to 915 millimeters), increasing with elevation. Most of the rainfall occurs as high-intensity, convective storms in spring and autumn. Precipitation is mostly snow in winter. Summers are dry. The average annual temperature is 37 to 54 degrees F (3 to 12 degrees C). The freeze-free period averages 115 days and ranges from 40 to 195 days, decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or smectitic mineralogy. They generally are well drained, are clayey or loamy and commonly skeletal, and are very shallow to moderately deep.

This area supports shrub-grass vegetation characterized by big sagebrush. Low sagebrush and Lahontan sagebrush occur on some soils. Antelope bitterbrush, squirreltail, desert needlegrass, Thurber needlegrass, and Indian ricegrass are important associated plants. Green ephedra, Sandberg bluegrass, Anderson peachbrush, and several forb species also are common. Juniper-pinyon woodland is typical on mountain slopes. Jeffrey pine, lodgepole pine, white fir, and manzanita grow on the highest mountain slopes. Shadscale is the typical plant in the drier parts of the area. Sedges, rushes, and moisture-loving grasses grow on the wettest parts of the wet flood plains and terraces. Basin wildrye, alkali sacaton, saltgrass, buffaloberry, black greasewood, and rubber rabbitbrush grow on the drier sites that have a high concentration of salts.

Some of the major wildlife species in this area are mule deer, coyote, beaver, muskrat, jackrabbit, cottontail, raptors, pheasant, chukar, blue grouse, mountain quail, and mourning dove. The species of fish in the area include trout and catfish. The Lahontan cutthroat trout in the Truckee River is a threatened and endangered species.

LRU notes

The Sierra Influenced Ranges LRU is characterized by wooded great basin mountains with climatic and biotic affinities to the Sierra Nevada mountain range. The Sierra Influences Ranges LRU receives greater precipitation than the mountain ranges of central NV. Amount of precipitation varies in relation to the local strength of the Sierra NV rain shadow, characterized by pinyon and juniper trees. The White, Sweetwater, Pine Nut, Wassuk, and Virginia ranges of Nevada support varying amounts of Sierra Nevada flora, such as ponderosa pine. Elevations range from 1610 to 2420 meters and slopes range from 5 to 49 percent, with a median value of 22 percent. Frost free days (FFD) ranges from 92 to 163.

Ecological site concept

The Claypan 12-14 P.Z. is found on shallow to deep soils on fan remnants and mountain slopes. The Claypan 12-14 P.Z. is typically found at elevations between 6400 and 8000 feet on slopes between 2 and 30 percent. The soil surface texture is very gravelly ashy sandy loam to very gravelly coarse sandy loam. There is an increase in clay in the soil subsurface that influences the plant community. The dominant species are little (low) sagebrush (*Artemisia arbuscula*) and Thurber's needlegrass (*Achnatherum thurberianum*).

Associated sites

R026XY005NV	LOAMY 12-14 P.Z.
R026XY040NV	GRAVELLY LOAM 14+ P.Z.

Similar sites

R026XY028NV	MOUNTAIN RIDGE Less productive site; ACPI2 dominant grass
R026XY090NV	SCABLAND 10-14 P.Z. POSE dominant grass; less productive site
R026XY023NV	CLAYPAN 10-12 P.Z. PUTR2 important shrub; less productive site
R026XY039NV	CLAYPAN 14+ P.Z. Higher elevations; ACLE9 dominant grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula</i>
Herbaceous	(1) <i>Achnatherum thurberianum</i>

Physiographic features

This site occurs on upper fan remnant slopes and lower mountains on all aspects. Slopes range from 2 to 30 percent. Elevations are 6400 to 8000 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Mountain slope
Elevation	6,400–8,000 ft
Slope	2–30%

Aspect	Aspect is not a significant factor
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Climatic features

The climate associated with this site is subhumid with cool, dry summers and cold, wet winters. Average annual precipitation is 12 to 14 inches. Mean annual air temperature is 41 to 45 degrees F. The average growing season is about 50 to 100 days. Climate data used to support this section were derived from PRISM and is not specifically tied to any dominant climate station.

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating.

Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	12-14 in
Frost-free period (average)	75 days
Freeze-free period (average)	
Precipitation total (average)	13 in

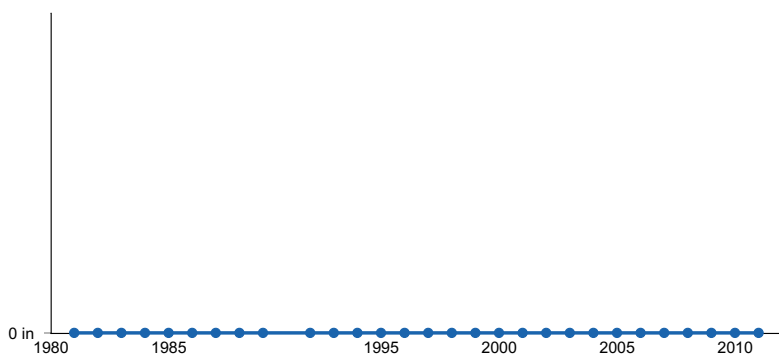


Figure 1. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site consists of shallow to a restrictive layer, either bedrock, a duripan or an argillic horizon. The soils are well drained soils that formed in alluvium derived from volcanic rocks, chert, sedimentary rocks, loess, and andesite with surficial additions of eolian volcanic ash. The soils typically have a mollic epipedon. The soil moisture regime is aridic bordering on xeric and the soil temperature regime is frigid. The soil series associated with this site include Fisherdig, Delmo, Domehill, Chen, and Mopana.

A representative soil series is Mopana, a clayey, smectitic, frigid, shallow Vitritorrandic Durixerolls. A mollic epipedon occurs from the soil surface to 20 cm and an argillic horizon occurs from 10 to 48 cm. A duripan is present from 48 to 152 cm.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Very gravelly, ashy sandy loam (2) Very gravelly coarse sandy loam
Family particle size	(1) Clayey-skeletal
Drainage class	Well drained
Permeability class	Very slow to moderate
Soil depth	14–60 in
Surface fragment cover <=3"	33–65%
Surface fragment cover >3"	2–10%
Available water capacity (0-40in)	2–3.1 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	29–60%
Subsurface fragment volume >3" (Depth not specified)	2–15%

Ecological dynamics

This site responds differently to excessive use by different classes of livestock. Abusive sheep use will decrease abundance of Thurber's needlegrass, bluegrasses, and forbs. Early season cattle use decreases Thurber's needlegrass composition as low sagebrush, bottlebrush squirreltail, and bluegrass densities increase. Cheatgrass is most likely to invade this site. Utah juniper and singleleaf pinyon will increase on this site.

Fire Ecology:

Prior to 1897, mean fire return intervals for low sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Low sagebrush is very susceptible to fire damage. Low sagebrush is usually killed by fire and does not re-sprout. The recovery in burned areas is

usually via small, light, wind-dispersed seed for all low sagebrush subspecies. Partially injured low sagebrush may re-grow from living branches, but sprouting does not occur.

Thurber needlegrass is classified as moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Early season burning is more damaging to this needlegrass than late season burning.

This is a text description of the states, phases, transitions, and community pathways possible in the State and Transition model for the MLRA 26 Disturbance Response Group 2.

Reference State 1.0: Community Phase Pathways: The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. The reference state has three general community phases: a shrub-grass dominant phase, a perennial grass dominant phase and a shrub dominant phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack.

Community Phase 1.1: This community is dominated by Lahontan/low sagebrush, bluegrasses and Thurber's needlegrass. Forbs and other grasses make up smaller components. Pinyon and juniper may or may not be present.

Community Phase Pathway 1.1a, from Phase 1.1 to 1.2: Fire will decrease or eliminate the overstory of sagebrush and allow the perennial bunchgrasses to dominate the site. Fires will typically be low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring may be more severe and reduce sagebrush cover to trace amounts.

Community Phase Pathway 1.1b, from Phase 1.1 to 1.3: Time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Long-term drought, herbivory, or combinations of these will cause a decline in perennial bunchgrasses and fine fuels leading to a reduced fire frequency and allowing sagebrush to dominate the site.

Community Phase 1.2: This community phase is characteristic of a post-disturbance, early/mid-seral community. Thurber's needlegrass, bluegrasses, and other perennial bunchgrasses dominate. Depending on fire severity, patches of intact sagebrush may remain. Rabbitbrush and other sprouting shrubs may be sprouting. Perennial forbs may be a significant component for several years following fire.

Community Phase Pathway 1.2a, from Phase 1.2 to 1.1: Time and lack of disturbance will allow sagebrush to increase.

Community Phase 1.3: Sagebrush increases in the absence of disturbance. Mature and/or decadent sagebrush dominates the overstory and the deep-rooted perennial bunchgrasses in the understory become minor component either from competition with shrubs and/or from herbivory. Sandberg bluegrass may become co-dominant with deep rooted bunchgrasses. Pinyon and juniper may be present.

Community Phase Pathway 1.3a, from Phase 1.3 to 1.1: A low severity fire, herbivory or combinations will reduce the sagebrush overstory and create a sagebrush/grass mosaic.

Community Phase Pathway 1.3b, from Phase 1.3 to 1.2: Fire will decrease or eliminate the overstory of sagebrush and allow the perennial bunchgrasses to dominate the site. Fires may be high severity in this community phase due to the dominance of sagebrush resulting in removal of overstory shrub community.

T1A: Transition from the Reference State 1.0 to Current Potential State 2.0:

Trigger: This transition is caused by the introduction of non-native annual plants, such as cheatgrass, medusahead, mustards, and bur buttercup.

Slow variables: Over time, the annual non-native plants will increase within the community. The change in dominance from perennial grasses to annual grasses reduces organic matter inputs from root turn-over, resulting in reductions in soil water availability.

Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter

disturbance regimes from their historic range of variation.

T1B: Transition from the Reference State 1.0 to Shrub State 3.0:

Trigger: To Community Phase 3.1: Long term lack of fire and/or inappropriate grazing will decrease or eliminate deep-rooted perennial bunchgrasses, increase Sandberg bluegrass and favor shrub growth and establishment. To Community Phase 3.2: Severe fire in community phase 2.3 will remove sagebrush overstory, decrease perennial bunchgrasses and enhance Sandberg bluegrass.

Slow variables: Long term decrease in deep-rooted perennial grass density.

Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and reduces soil organic matter.

Current Potential State 2.0 Community Phase Pathways: This state is similar to the Reference State 1.0. Ecological function has not changed; however, the resiliency of the state has been reduced by the presence of invasive weeds. This state has four general community phases. These non-native species can be highly flammable and promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community Phase 2.1: This community phase is similar to the Reference State Community Phase 1.1, with the presence of non-native species in trace amounts. Lahontan/low sagebrush, bluegrasses, and Thurber's needlegrass dominate the site. Forbs and other shrubs and grasses make up smaller components of this site. Community Phase Pathway 2.1a, from Phase 2.1 to 2.2: Fire reduces the shrub overstory and allows for perennial bunchgrasses to dominate the site. Fires are typically low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring or a change in management favoring an increase in fine fuels may be more severe and reduce sagebrush cover to trace amounts. Annual non-native species are likely to increase after fire.

Community Phase Pathway 2.1b, from Phase 2.1 to 2.3: Time and lack of disturbance allows for sagebrush to increase and become decadent. Long-term drought reduces fine fuels and leads to a reduced fire frequency, allowing Lahontan/low sagebrush to dominate the site. Inappropriate grazing management reduces the perennial bunchgrass understory; conversely Sandberg bluegrass may increase in the understory depending on grazing management.

Community Phase 2.2: This community phase is characteristic of a post-disturbance, early to mid-seral community where annual non-native species are present. Sagebrush is present in trace amounts; perennial bunchgrasses dominate the site. Depending on fire severity patches of intact sagebrush may remain. Rabbitbrush may be sprouting or dominant in the community. Perennial forbs may be a significant component for a number of years following fire. Annual non-native species are stable or increasing within the community.

Community Phase Pathway 2.2a, from Phase 2.2 to 2.1: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows the shrub component to recover. The establishment of sagebrush can take many years.

Community Phase 2.3 (At Risk): This community is at risk of crossing a threshold to another state. Sagebrush dominates the overstory and perennial bunchgrasses in the understory are minor components, either from competition with shrubs or from inappropriate grazing, or from both. Rabbitbrush may be a significant component. Sandberg bluegrass may become co-dominant with deep rooted bunchgrasses. Annual non-natives species may be stable or increasing due to lack of competition with perennial bunchgrasses. This site is susceptible to further degradation from grazing, drought, and fire.

Community Phase Pathway 2.3a, from Phase 2.3 to 2.1: A change in grazing management that reduces shrubs will allow the perennial bunchgrasses in the understory to dominate. Heavy late-fall or winter grazing may cause mechanical damage and subsequent death to sagebrush, facilitating an increase in the herbaceous understory. Brush treatments with minimal soil disturbance will also decrease sagebrush and release the perennial understory. A low severity fire would decrease the overstory of sagebrush or leave patches of shrubs and would allow the understory perennial grasses to dominate. Annual non-native species are present and may increase in the

community.

Community Phase Pathway 2.3b, from Phase 2.3 to 2.2: Fire eliminates/reduces the overstory of sagebrush and allows the understory perennial grasses to dominate. Fires may be high severity in this community phase due to the dominance of sagebrush resulting in removal of overstory shrub community. Annual non-native species respond well to fire and may increase post burn.

T2A: Transition from Current Potential State 2.0 to Shrub State 3.0 Trigger: To Community Phase 3.1: Inappropriate grazing will decrease or eliminate deep-rooted perennial bunchgrasses, increase Sandberg bluegrass and favor shrub growth and establishment. To Community Phase 3.2: Severe fire in community phase 2.3 will remove sagebrush overstory, decrease perennial bunchgrasses and enhance Sandberg bluegrass. Annual non-native species will increase.

Slow variables: Long term decrease in deep-rooted perennial grass density.

Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and reduces soil organic matter.

Shrub State 3.0 Community Phase Pathways: This state is a product of long-term lack of fire and/or many years of heavy grazing during time periods harmful to perennial bunchgrasses. Sandberg bluegrass may increase with a reduction in deep rooted perennial bunchgrass competition and become the dominant grass. Sagebrush dominates the overstory and rabbitbrush may be a significant component. Sagebrush cover exceeds site concept and may be decadent, reflecting stand maturity and lack of seedling establishment due to competition with mature plants. The shrub overstory and bluegrass understory dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Community Phase 3.1 (At Risk): Lahontan/low sagebrush dominates the overstory and may be decadent. Rabbitbrush may be a significant component. Deep-rooted perennial bunchgrasses may be present in trace amounts or absent from the community. Sandberg bluegrass and annual non-native species increase. Bare ground is significant. Pinyon and juniper may be present.

Community Phase Pathway 3.1a, from Phase 3.1 to 3.2: Fire, heavy fall grazing causing mechanical damage to shrubs, and/or brush treatments with minimal soil disturbance, will greatly reduce the overstory shrubs to trace amounts and allow Sandberg bluegrass to dominate the site.

Community Phase 3.2: Bluegrass dominates the site; annual non-native species may be present but are not dominant. Sprouting shrubs may increase. Trace amounts of sagebrush may be present with Thurber's needlegrass and other perennial grasses a minor component or missing altogether.

Community Phase Pathway 3.2a, from Phase 3.2 to 3.1: Time and lack of disturbance and/or grazing management that favors the establishment and growth of sagebrush allows the shrub component to recover. The establishment of Lahontan/low sagebrush can take many years.

T3A: Transition from Shrub State 3.0 to Tree State 4.0: Trigger: Absence of disturbance over time allows for Utah juniper or western juniper dominance.

Feedbacks and ecological processes: Trees increasingly dominate use of soil water, contributing to reductions in soil water availability to grasses and shrubs. Overtime, grasses and shrubs are outcompeted. Reduced herbaceous and shrub production slows soil organic matter inputs and increases soil erodibility through loss of cover and root structure. Slow variables: Long-term increase in juniper and/or western juniper density.

Threshold: Trees overtop Lahontan/low sagebrush and out-compete shrubs for water and sunlight. Shrub skeletons exceed live shrubs in number. There is minimal recruitment of new shrub cohorts.

Tree State 4.0 Community Phase Pathways: This state is characterized by a dominance of pinyon and juniper in the overstory. Lahontan sagebrush and perennial bunchgrasses may still be present, but they are no longer controlling site resources. Soil moisture, soil nutrients and soil organic matter distribution and cycling have been spatially and temporally altered.

Community Phase 4.1: Pinyon and juniper dominate the overstory and site resources. Trees are actively growing with noticeable leader growth. Trace amounts of bunchgrass may be found under tree canopies with trace amounts of Sandberg bluegrass and forbs in the interspaces. Sagebrush is stressed and dying. Annual non-native species are present under tree canopies. Bare ground interspaces are large and connected.

Community Phase Pathway 4.1a, from Phase 4.1 to 4.2: Time and lack of disturbance or management action allows for tree cover and density to further increase and trees to out-compete the herbaceous understory species for sunlight and water.

Community Phase 4.2: Pinyon and juniper dominate overstory. Lahontan/low sagebrush is decadent and dying with numerous skeletons present or sagebrush may be missing from the system. Bunchgrasses present in trace amounts and annual non-native species may dominate understory. Herbaceous species may be located primarily under the canopy or near the drip line of trees. Bare ground interspaces are large and connected. Soil movement may be apparent.

Community Phase Pathway 4.2a, from Phase 4.2 to 4.1: Tree Thinning treatment (typically for fuels management).

R4A Restoration Pathway from State 4 to State 2: Tree removal.

State and transition model

MLRA 26
Group 2
Claypan 10-12"
026XY023NV

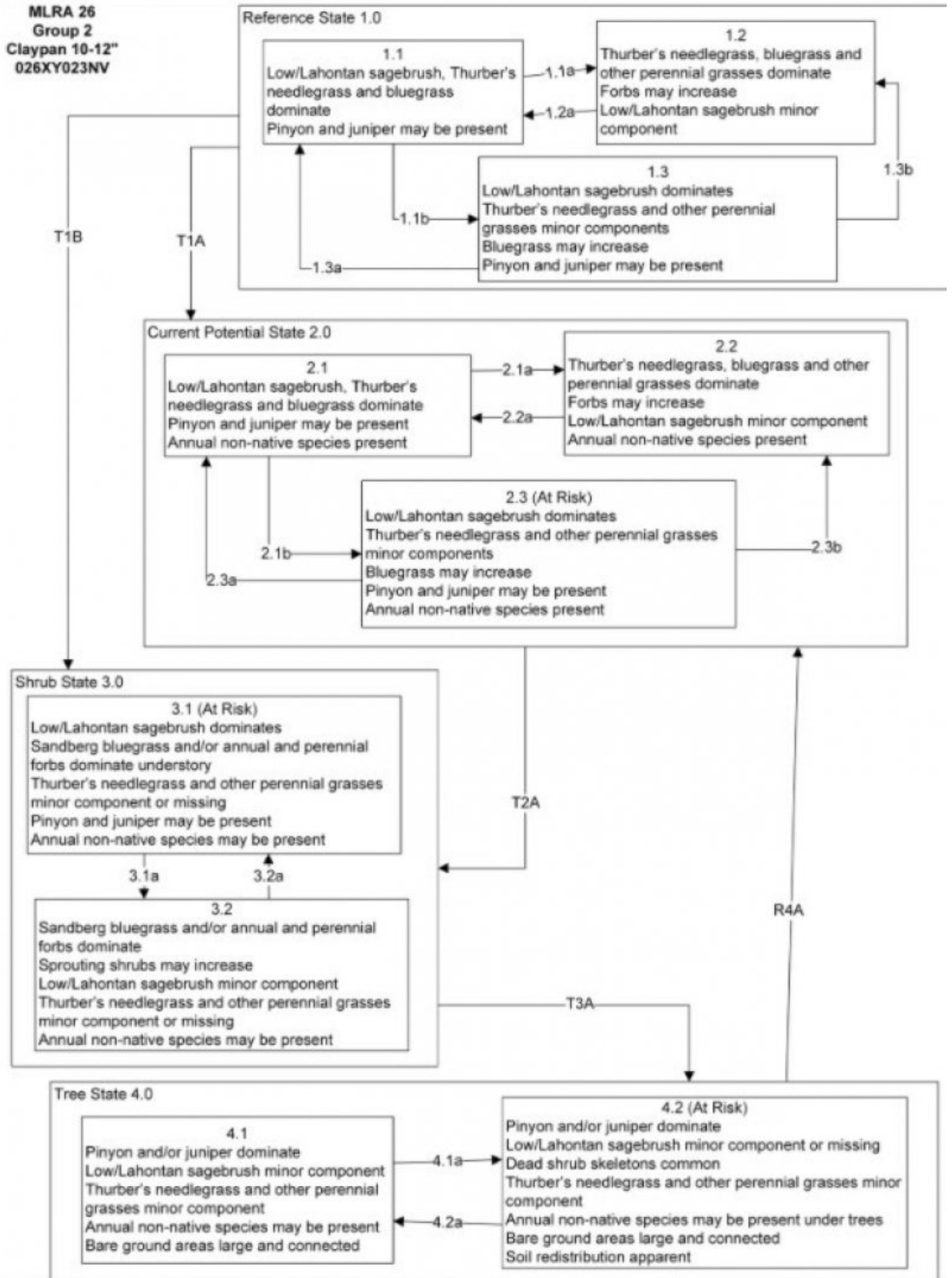


Figure 3. Similar STM

State 1
Reference State

Community 1.1
Reference Plant Community

The reference plant community is dominated by low sagebrush and Thurber's needlegrass. Potential vegetative composition is about 55% grasses, 10% forbs and 35% shrubs. Approximate ground cover (basal and crown) is 30 to 45 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	110	220	275
Shrub/Vine	70	140	175
Forb	20	40	50
Total	200	400	500

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			160–300	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	120–200	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	20–60	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	10–20	–
2	Secondary Perennial Grasses			8–32	
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	2–8	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	2–8	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	2–8	–
Forb					
3	Perennial			20–60	
	rockcress	ARABI2	<i>Arabis</i>	2–12	–
	aster	ASTER	<i>Aster</i>	2–12	–
	balsamroot	BALSA	<i>Balsamorhiza</i>	2–12	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	2–12	–
	haplopappus	HAPLO11	<i>Haplopappus</i>	2–12	–
	lupine	LUPIN	<i>Lupinus</i>	2–12	–
	phlox	PHLOX	<i>Phlox</i>	2–12	–
Shrub/Vine					
4	Primary Shrubs			80–120	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	80–120	–
5	Secondary Shrubs			8–40	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	4–12	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	4–12	–
	pricklyphlox	LEPTO2	<i>Leptodactylon</i>	4–12	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	4–12	–
Tree					
6	Evergreen			2–16	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	1–8	–
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	1–8	–

Animal community

Livestock Interpretations:

This site is suited for livestock grazing. Grazing management should be keyed to perennial grasses and palatable shrub production. Needlegrass species begin growth early in the year and remain green throughout a relatively long growing season. This pattern of development enables animals to use needlegrass when many other grasses are unavailable. Cattle prefer needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Needlegrasses are usually grazed in the fall only if the fruits are softened by rain. Domestic sheep and to a much lesser degree cattle consume low sagebrush, particularly during the spring, fall and winter.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:

Low sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Low sagebrush is an important food source for sage grouse throughout the year, especially between October and April. Mule deer utilize and sometimes prefer low sagebrush, particularly in winter and early spring. Thurber's needlegrass is another important forage species for several wildlife species.

Hydrological functions

Runoff is medium to very high.

Recreational uses

This site offers opportunities for hunting, camping, hiking and photography.

Type locality

Location 1: Douglas County, NV	
Township/Range/Section	T12N R22E S11
General legal description	Douglas County, Nevada in the Pinenut Mountains. This site also occurs in Mineral County, Nevada and Mono County, California.

Other references

Fire Effects Information System (Online; <http://www.fs.fed.us/database/feis/plants/>).

USDA-NRCS Plants Database (Online; <http://www.plants.usda.gov>).

Contributors

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Approval

Kendra Moseley, 4/10/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	07/19/2013
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare. Rock fragments armor the surface.

2. **Presence of water flow patterns:** Waterflow patterns are none to rare but can be expected in areas recently subjected to summer convection storms or rapid snowmelt, usually on steeper slopes.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is usually limited to areas of waterflow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 10-30% depending on amount of surface rock fragments

5. **Number of gullies and erosion associated with gullies:** None.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 3 to 6 on most soil textures found on this site. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick platy, or subangular blocky. Soil surface colors are browns or grayish-browns and soils are typified by a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 1.25 to 3 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [needlegrasses and Junegrass] slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are none. Subangular blocky structure or subsoil argillic horizons are not to be interpreted as compacted.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live**

foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant: Deep-rooted, cool season, perennial bunchgrasses [needlegrasses, Junegrass]

Sub-dominant: low shrubs (low sagebrush)>deep-rooted, cool season, perennial forbs> associated shrubs >shallow-rooted, cool season, perennial bunchgrasses> fibrous, shallow-rooted, cool season, perennial and annual forbs

Other: evergreen trees

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.
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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces 30-40% and litter depth is < 1/4 inch.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through June) \pm 400 lbs/ac; Favorable years \pm 500 lbs/ac and unfavorable years \pm 200 lbs/ac
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Potential invaders include cheatgrass, Russian thistle, annual mustards, and medusahead.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Reduce growth and reproduction occurs during extreme or extended drought conditions.
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